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ABSTRACT

Designed to familiarize the student with the components and operations of automatic gas and electric dryers, this course outlines the principles of drying and how they relate to the automatic dryer. Instruction centers upon the functions and operations of dryer components and the recognition and identification of various component malfunctions, providing students with the opportunity to overhaul and repair dryer components. Included in the course content are goals, specific block objectives, orientation, automatic dryers (construction, principles of drying, installation), dryer component functions and operations, component malfunctions, overhaul and repair, a post-test, and a bibliography. The appendix contains post-test samples. (NH)

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AUTHORIZED COURSE OF INSTRUCTION FOR THE QUINMESTER PROGRAM

V-19

Course Outline
APPLIANCE REPAIR - INTERMEDIATE - 9025
(Automatic Dryers: Components and Operations)
Department 48 - Quin 9025.01

CE002200

DADE COUNTY PUBLIC SCHOOLS
DIVISION OF INSTRUCTION • 1973

ED 097138

DADE COUNTY PUBLIC SCHOOLS
1450 NORTHEAST SECOND AVENUE
MIAMI, FLORIDA 33132

Course Outline

APPLIANCE REPAIR - INTERMEDIATE - 9025
(Automatic Dryers: Components and Operations)

Department 48 - Quin 9025.01

county office of
VOCATIONAL AND ADULT EDUCATION

THE SCHOOL BOARD OF DADE COUNTY

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Dr. E. L. Whigham, Superintendent of Schools
Dade County Public Schools
Miami, Florida 33132

January, 1973

Published by the School Board of Dade County

Course Description

9025	48	9025.01	Automatic Dryers: Components and Operations
State Category	County Dept. Number	County Course Number	Course Title

This quinmester course includes removing and replacing dryer components, operations and functions of dryer components, identifying component malfunctions, and gas and electric dryer installation procedures. This is a one, two, or three quinmester credit course.

Indicators of success: Prior to entry into this course, the vocational student will display mastery of the skills indicated in Ranges (9023.05) or Water Heaters and Dishwashers (9023.04).

Clock Hours: 45, 90, 135

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PREFACE

The following quinmester course outline 9025.01, is presented to introduce and familiarize the student to the components and operations of automatic gas and electric dryers. It is intended that this course will permit the learner to become familiar with the principles of drying and how they relate to the automatic dryer. It will serve to instruct him in the functions and operations of dryer components, and will teach him to recognize and identify various component malfunctions. The course also serves to provide the student with a knowledge of the job operations involved in the overhaul and repair of dryer components, as well as offering him an opportunity to exercise and practice these specific manipulative arts.

This course may be taught in a single Quinmester session (1 hour class) for 45 clock hours, a double Quinmester session (2 hour block) for 90 clock hours, or a triple Quinmester session (3 hour block) for 135 clock hours. In each instance the course consists of six instructional blocks; however, the double or triple session permits the student to cover each block in more detail and also provides added opportunity in which to practice and increase his skills.

Manipulative instructional methods include demonstration and shop use of actual appliances, tools, equipment and appliance components, as well as mock-ups and demonstration pieces and kits. Related instruction is taught through lecture, books, service and tool manuals, instructional sheets, and chalkboard

presentations. Students are expected to keep notebooks and to complete daily related and manipulative assignments.

An adjunct to the listed instructional methods is provided through the instructor's utilization of audiovisual equipment and materials.

This outline was developed through the cooperative efforts of instructional and supervisory personnel, the Quinmester Advisory Committee and the Vocational Curriculum Materials Service, and has been approved by the Dade County Vocational Curriculum Committee.

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with suggested hourly breakdown

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BLOCK

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- Introduction . . . 1
- Student Responsibilities . . . 1
- Course Benefits . . . 1

II. AUTOMATIC DRYERS (18 hours)
- Construction . . . 1
- Principles of Drying . . . 2
- Installation . . . 2

III. DRYER COMPONENT (FUNCTIONS AND OPERATIONS) (10 hours)
- Control Components . . . 2
- Operating Components . . . 2
- Gas Burner Components . . . 3

IV. COMPONENT MALFUNCTIONS (20 hours)
- Mechanical Malfunctions . . . 3
- Electrical Malfunctions . . . 3
- Gas Heater Malfunctions . . . 3

V. OVERHEAUL AND REPAIR (40 hours)
- Replacing Components . . . 4
- Repairing Components . . . 4

VI. QUINMESTER POST-TEST

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GOALS

The student must be able to:

1. Compare the similarities of operation between ranges and dryers.

2. Describe and explain the operations of an automatic dryer.

3. Install, demonstrate and post-check dryers.

4. Identify dryer components and describe the function and operation of each.

5. Identify component breakdowns and malfunctions and relate them to specific operating or control components.

6. Remove dryer components, disassemble them, identify worn or defective component parts, re-assemble the components and reinstall them in the dryer.

SPECIFIC BLOCK OBJECTIVES

BLOCK I ORIENTATION

The student must be able to:

1. Discuss the purpose and function of the automatic dryer in the home laundry as it relates to the home laundering process.
2. Differentiate between electric and gas dryers.
3. Demonstrate the relationship of electrical effects to the functional uses of electricity.
4. Work in a safe and responsible manner by himself and around others thereby demonstrating his understanding of all school and shop safety rules.
5. Exhibit the ability to apply previous knowledge and skills learned in ranges and water heaters.

BLOCK II AUTOMATIC DRYERS

The student must be able to:

1. Remove and replace dryer cabinet panels, doors and other static components in order to service functioning components.
2. Compare the principles of drying to the automatic dryer.
3. Install a dryer, making all plumbing and electrical connections necessary for proper normal installation.
4. Connect rigid and flexible venting between the dryer exhaust duct and the exhaust hood, observing all rules of proper venting.
5. Demonstrate the proper use of a dryer to someone who has never before operated one.
6. Post check the dryer and detect any variance of normal operations; check for poor connections, gas leaks or any other installation faults.

BLOCK III DRYER COMPONENT (FUNCTIONS AND OPERATIONS)

The student must be able to:

1. Visually identify and name all dryer control components while explaining the function and purpose of each.

2. Visually identify and name all dryer operating components while explaining the function and operations of each.

3. Exhibit the ability to relate the operations of the different type pilot assemblies to the burner and describe the actions of each.

BLOCK IV COMPONENT MALFUNCTIONS

The student must be able to:

1. Locate and identify noisy mechanical components.

2. Locate and identify non-operating and improperly operating mechanical electrical and heater components.

3. Locate and identify non-operating burners and pilot assemblies.

BLOCK V OVERHAUL AND REPAIR

The student must be able to:

1. Remove and replace dryer components, assuring that all connections are properly made and the component is securely re-installed.

2. Dis-assemble rebuildable dryer components and identify worn or defective component parts.

3. Re-assemble rebuildable dryer components, replacing worn or defective component parts, and lubricating in areas of friction before final assembly.

BLOCK VI QUINMESTER POST-TEST

The student must be able to:

1. Satisfactorily complete the quinmester post-test.

Course Outline

APPLIANCE REPAIR - INTERMEDIATE - 9025
(Automatic Dryers: Components and Operations)

Department 48 - Quin 9025.01

I. ORIENTATION

A. Introduction
   1. Automatic clothes dryers
      a. Electric dryers
      b. Gas dryers
   2. Relating basic electricity to dryer operations
      a. Practical use of the "thermal" effect
      b. Practical use of the "magnetic" effect
      c. Mechanical energy

B. Student Responsibilities
   1. Safety
      a. Identifying hazards
      b. Working on dryers with others
      c. Shop and school safety rules
   2. Shop regulations
      a. Care of equipment
      b. Reporting lost or damaged articles
      c. Clean-up assignments

C. Course Benefits
   1. Advancing trade knowledge
      a. Working on a clothes dryer
      b. Comparisons with, and to, working on a range
   2. Preparation for the next course

II. AUTOMATIC DRYERS

A. Construction
   1. The cabinet
      a. Cabinet panels
      b. The door, hinges and latch
      c. Static components
         (1) Internal ducting
         (2) Lint filter
         (3) Levelling legs
   2. The console
      a. The control panel
      b. Console lamps

B. Principles of Drying
   1. Principles of drying
      a. Clothesline drying
         (1) Sun
         (2) Movement of air
         (3) Tumbling action
      b. The automatic dryer
         (1) The heater
         (2) The blower
         (3) The drum
   2. Dryer cycles
      a. Heat
      b. Air fluff (cool down)

C. Installation
   1. Installing the dryer
      a. Connections and hook-up
      b. Venting
   2. Post check
      a. Demonstration
      b. Checking dryer performance

III. DRYER COMPONENTS (FUNCTIONS AND OPERATIONS)

A. Control Components
   1. Cycle controls
      a. Timers
      b. Electronic controls
      c. Auto-dry thermostats
   2. Heat controls
      a. Thermostats
      b. Thermo-couples
   3. Switches
      a. Safety switches
         (1) Door switch
         (2) Motor centrifugal switch
         (3) Motor start switch
      b. Selector switches
         (1) Air-heat switch
         (2) Speed switch
         (3) Cycle selector switch

B. Operating Components
   1. Heat components
      a. Electric heat elements
      b. Gas burners
   2. Air movement components
      a. Blowers and exhaust fans
      b. Blower drive system components
   3. Tumbling action components
      a. The drum, cylinder or basket
      b. Basket drive system components

4. The Drive motor
   a. The split/phase motor
   b. The double function centrifugal switch
   c. The complete drive system

C. Gas Burner Components
   1. Burners
      a. Manual ignition burners
      b. Automatic ignition burners
   2. Pilot Assemblies
      a. Manual pilots
      b. Automatic ignition
         (1) Spark igniter
         (2) Glo-coil and glo-sil igniters
      c. Pilot switches and power packs

IV. COMPONENT MALFUNCTIONS

A. Mechanical Malfunctions
   1. Noise
      a. Bearings (worn or loose)
      b. Broken vanes
      c. Drive system components
      d. Solenoids
   2. Non-operating or improperly operating
      a. Motor
      b. Drive system
      c. Bearings (worn or seized)

B. Electrical Malfunctions
   1. Non-operating or improperly operating
      a. The timer
      b. The motor
      c. Door switch, motor start switch
   2. Heat
      a. The heater
      b. Thermostats
      c. Centrifugal heat switch (motor)
      d. Air-heat switch
      e. The timer

C. Gas Heater Malfunctions
   1. Noise
      a. Warp-out device
      b. Solenoids or sucking coils
   2. Heat
      a. Burner orifice
      b. Pressure regulator
      c. Thermostats
      d. Pilot assembly
         (1) Igniter
         (2) Pilot switch or power pack
         (3) Warp-out resistor
      e. Solenoids or sucking coils

V. OVERHAUL AND REPAIR

A. Replacing Components
   1. Removing parts
      a. Locating the component
      b. Removing any and all wire leads and connections
      c. Identifying lead placement and component position
      d. Removing securing bolts, nuts or screws
      e. Removing the component from the dryer
   2. Re-installing a part
      a. Positioning the component
      b. Identifying and connecting all leads
      c. Securing the component in the dryer
      d. Checking position,clearance and lead connections
      e. Performance check dryer

B. Repairing Components
   1. Disassembling the part
      a. Removing bolts, nuts or screws
      b. Checking for defects or wear
      c. Replacing worn or defective component parts
   2. Reassembling the part
      a. Lubricate all points of friction
      b. Replace seals or gaskets
      c. Reassemble component parts
      d. Check all clearances
      e. Replace nuts, bilts or screws

VI. QUINMESTER POST-TEST

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1. How To Read A.S.A. Wiring Diagrams. Booklet G-3 #821349. La Porte, Indiana: Whirlpool Corp. 1965. Pp 28.

2. Marcus, Abraham. Basic Electricity 2nd ed. Englewood Cliffs, New Jersey: Prentice Hall Inc., 1964

3. Suffern, Maurice Grayle. Basic Electrical and Electronic Principles. 3rd ed. New York: McGraw Hill Book Co. Inc., 1956. Pp 604.

Supplementary References:

4. Appliance Motors. Manual #9911. Mansfield, Ohio: Westinghouse Corp., Major Appliance Service Information Department, 1967. Pp 36.

5. Dryer Electrical Controls. Booklet L-25 #828998. La Porte, Indiana: Whirlpool Corp.

6. Principles of Drying and Basic Dryer Components. Booklet L-11 #820945. La Porte, Indiana: Whirlpool Corp.

7. Trouble Diagnosis and Service Procedures. Booklet G-7 #828977: La Porte, Indiana: Whirlpool Corp.

Filmstrips and Cassettes:

8. Dryer Electrical Controls. La Porte, Indiana: Whirlpool Corp. Filmstrip L-25 #828996; Cassete: L-25 #828997

9. Principles of Drying and Basic Dryer Components. La Porte, Indiana: Whirlpool Corp. Filmstrip L-11 #820944

A P P E N D I X

Quinmester Post-Test Samples

Quinmester Post-Test

Name_____ Date_____ Score___

I. MULTIPLE CHOICE (Related Test)

1. Gas dryers operate through a supply voltage of approximately (a) 120 volts (b) 208 volts (c) 240 volts (d) 120 volts or 240 volts (e) any of the above could be correct

2. An example of a dryer component which produces the thermal effect of electricity is (a) the drive motor (b) the thermostat (c) the timer (d) the resistance element (e) the blower

3. An electric dryer's elements are different than an electric range's in that the dryer's are (a) enclosed sheath type (b) open coil type (c) not made of nichrome (d) lower resistance (e) thermostat controlled

4. An automatic dryer will (a) damp dry clothes (b) dry permanent press clothes (c) dry clothes completely (d) air-fluff clothes (e) do all of the above

5. It is well to remember that an exposed heater element can cause (a) severe burns only (b) electrical shocks only (c) severe burns and shocks (d) no serious harm (e) none of the above are correct

6. If a dryer uses a heater element which measures a resistance of 12 ohms, it should, when operated from a 240 volt supply, produce (a) 1200 watts (b) 1800 watts (c) 2400 watts (d) 4800 watts (e) 9600 watts

7. If the supply voltage for the heater element in question six is 120 volts, it should then produce (a) 1200 watts (b) 1800 watts (c) 2400 watts (d) 4800 watts (e) 9600 watts

Quinmester Post-Test

Name_____ Date _____ Score ___

II. COMPLETIONS [Related Test]

1. The _____ of a dryer usually houses controls, such as the timer.

2. A _____ is used in a dryer to remove lint from the exhaust stream.

3. Moisture is removed from clothes when they are drying, by a process known as _____.

4. On a clothesline, the drying process is produced by the _____ and _____.

5. In an automatic dryer, this process is produced by a tumbling basket, a _____ and a _____.

6. A period at the end of the dry cycle in which no heat is produced is called a _____ period.

7. A normal installation consists of three parts, one is installing the dryer, the other two are _____ and _____.

8. You should use _____ to check for gas leaks at all pipe connections.

9. You must never use _____ to check for gas leaks.

10. Though there are exceptions, exhaust venting should generally never exceed _____ feet in length.

II. MANIPULATIVE TESTS

Installing a dryer

Materials and Equipment:
-Uncrated gas and electric dryers; one for each student taking the test. These dryers should be in the same approximate state of preparation as new, uninstalled appliances.
-Tool box containing all tools needed for installation
-Protective pad
-Service order book
-Appliance owner [simulated]
-Locations for gas or electric hook-ups, and external venting

Procedure #1:
Student is to place appliance in proper location and proceed to complete installation

Procedure #2:
Student is to post-check appliance through for normal operation

Procedure #3:
Student is to demonstrate appliance to owner

Quinmester Post-Test

Name_____ Date_____ Score____

III. DRYER COMPONENTS

Write a "C" for control, or "O" for operating in the space provided next to each component to indicate whether it is a control component or operating component.

1. _____Timer
2. _____Door Switch
3. _____Drive motor
4. _____Thermostat
5. _____Heater
6. _____Blower
7. _____Drive belt
8. _____Centrifugal switch
9. _____Gas burner
10. _____Air-heat switch

Answer the following questions true or False.

1. The double function centrifugal switch is only found in the drive motor of electric dryers. _____

2. The only time a safety thermostat will open is when the operating thermostat fails. _____

3. A thermo-couple produces a minute electrical current when heated. _____

4. Some dryers which have electronic controls do not have timers. _____

5. In many burners the "warp-out" is caused by a heat-producing resistor. _____

6. Some dryers use burners which operate without a pilot flame or switch. _____

7. Some thermostats can control the timer motor as well as the heater. _____

8. Dryer drive motors are usually repulsion type motors. _____

9. The safety thermostat is usually located in the exhaust air stream. _____

10. A door switch is sort of a safety switch. _____

Quinmester Post-Test

Name_____ Date _____ Score ____

IV. MATCHING (Related Test)

Match the non-operating component with the complaint by putting the correct component number in the space next to the complaint.

1. Drive Motor	a_____clothes come out soaking wet
2. Heater	b_____dryer never stops
3. Door Switch	c_____drum does not rotate
4. Timer	d_____clothes get too dry
5. Blower	e_____lights go on but nothing else works
6. Drive belt	f_____machine gun noise
	g_____machine operates with door open

IV. ESSAY

1. What complaints may you expect to hear from an owner who has not cleaned out the lint filter?_____

_____

_____

_____

2. What is the purpose of the warp-out switch in a gas dryer?

_____

_____

_____

3. List some of the symptoms of a defective tub-back bearing.

_____

_____

_____

4. What might be some of the results of a broken blower belt?

Quinmester Post-Test

Name_____ Date_____ Score____

V. MANIPULATIVE TEST

Overhaul and Repair

Materials and Equipment: (Procedure 1)
-Fully complimented gas and electric dryers located in an area in which they can be worked upon.
-Tool box containing all tools needed for removing dryer components.
-Job sheets (if necessary) outlining steps to complete the following jobs:
a. removing and replacing a dryer drive motor
b. removing and replacing a heater
c. removing and replacing an operating thermostat

Procedure #1:
Each student, in turn, must remove and replace a drive motor, heater, and operating thermostat, from a clothes dryer.

Note: This test may first be given with the students encouraged to use job sheets; it may then be given again, at a later date, without the benefit of the use of job sheets to test proficiency.

Materials and Equipment: (Procedure 2)
-Work stations; each containing either a burner unit, a blower, or a heater element assembly and roll of nichrome.
-Each station is to contain a bin of spare parts and the necessary tools to perform the overhaul of the component in that bin.

Procedure #2:
Each student, in turn, is to perform the following operations:

Station #1 (gas burner assembly)
Disassemble assembly; identify defective component, i.e. cracked O'rings, split gasket, etc., call instructor; select replacement parts; replace with worn or replacement parts on instructions from instructor.

Station #2 (blower assembly)
Disassemble assembly; identify defective component, i.e. chipped fan blade, seized bearing, etc., call instructor; select replacement parts; replace with worn or replacement parts on instructions from instructor.

Station #3 (heater element assembly)

Remove nichrome coil element; measure off length from roll to duplicate heaters wattage (use ohmmeter); call instructor; replace old nichrome coil element on instructions from instructor.

ANSWER KEY TO QUINMESTER POST-TEST

I. MULTIPLE CHOICE

1. a
2. d
3. b
4. e
5. c
6. d
7. a

II. COMPLETIONS

1. console or control panel
2. lint filter or screen
3. evaporation
4. sun - wind
5. heater - blower
6. cool - down
7. demonstrating - post checking
8. soapy water
9. a flame or match
10. 8

II. Manipulative (see separate sheet)

III.

1.	c	1.	F
2.	c	2.	F
3.	o	3.	t
4.	c	4.	t
5.	o	5.	t
6.	o	6.	F
7.	o	7.	t
8.	c	8.	F
9.	o	9.	F
10.	c	10.	t

IV. MATCHING (Related Test)

a. 2

b. 4

c. 6

d. -

e. 1

f. 5

g. 3

IV. ESSAY

1. clothes don't dry, or take too long to dry; smells burning; dryer stops and goes.

2. to prevent uninhibited flow of unignited gas

3. screeching noise; thumping noise: drum doesn't turn.

4. same as answer for question #1.

V. Manipulative Test (see separate sheet)

II. Manipulative Test

Students are to be checked and graded on the following:

Procedure #1

1. Proper location
2. Selection and use of tools
3. Removal of all shipping materials
4. Properly levelling dryer
5. Properly balancing dryer
6. Proper electrical hook-up
7. Positioning of venting
8. Safe and careful handling of dryer

Procedure #2

1. Tests for gas leaks (gas dryer only)
2. Checks electrical connections and ground
3. Checks to see drum is free to turn
4. Starts and checks that timer is advancing
5. Checks that heater cycles on and off
6. Checks for cool-down period
7. Checks for automatic turn off
8. Cleans up installation materials

Procedure #3

1. Gives owner "Owners" manual and points out operating instructions
2. Points out various controls on console panel and explains their function.
3. Demonstrates and explains dryer cycles
4. Observes while owner operates dryer
5. Explains normal operating noises
6. Fills out service order
7. Explains service order and offers for owners signature

V. Manipulative Test

Students are to be checked and graded on the following:

Procedure #1

1. Proper selection and use of tools
2. Orderliness (keeping parts together)
3. Use of time
4. Care in removing parts
5. Care in replacing parts
6. Safety
7. Position of wire leads after reinstalling part
8. Care and handling of dryer while working upon it
9. Post checking (simulate)
10. Clean-up

Procecure #2

1. Proper selection and use of tools
2. Orderliness (keeping things together)
3. Use of time
4. Care in disassembly
5. Care in reassembly
6. Safety
7. Identifying defective component part
8. Checking rebuilt component assembly
9. Clean-up

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